CONFIDENTIAL
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EXHIBIT E

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ENTROPIC COMMUNICATIONS, LLC, Plaintiff v. CHARTER COMMUNICATIONS, INC., Defendant.	Civil Action No. 2:22-cv-00125-JRG

OPENING EXPERT REPORT OF STEVEN H. GOLDBERG
REGARDING INVALIDITY OF U.S. PATENT NOS. 8,223,775;
8,284,690; 8,792,008; 9,210,362; 9,825,826; AND 10,135,682

bandwidth BW1 120 would span from 60-80 MHz, and, as a result, the down-converted bandwidth at the intermediate frequency would also require a bandwidth equal to at least BW1. *Id.*, 2:8-13.

360. The ’362 Patent observes that when “desired” RF channels are located both in the lower portion of the frequency band (such as VHF in terrestrial TV broadcasting or CATV) and in the higher portion of the frequency band (such as UHF in terrestrial TV broadcasting or channels in CATV's “ultra band”), the total bandwidth BW1 can be 800 MHz or higher. *Id.*, 2:14-20. According to the ’362 Patent, this is problematic because the “wide bandwidth of 800 MHz would require a very expensive digital processing circuitry such as very high-speed analog to digital conversion and high-speed processor in the demodulator.” *Id.*, 2:20-23. It is desirable to have wideband receiver systems that can increase the dynamic range without requiring expensive data conversion, filtering and channel selection at the demodulator.

b. Summary of the Alleged Invention of the ’362 Patent

361. The ’362 Patent purports to solve the above issues with conventional wideband tuners by disclosing “wideband receiver systems that can increase the dynamic range without requiring expensive data conversion, filtering and channel selection at the demodulator.” *Id.*, 2:24-27.

362. The ’362 patent allegedly achieves this result via “a wideband receiver system that is configured to concurrently receive multiple radio frequency (RF) channels including a number of desired channels that are located in non-contiguous portions of a frequency spectrum and group the desired channels in a contiguous or substantially-contiguous frequency band at an intermediate frequency spectrum, where the term ‘substantially-contiguous’ includes spacing the desired channels close to each other (e.g. as a fraction of the total system bandwidth, or relative to a channel bandwidth) but with a spacing that can be variable to accommodate the needs of overall system.” *Id.*, 2:31-42.

363. The wideband receiver of the '362 Patent includes:

> a complex mixer module for down-shifting the multiple RF channels and transforming them to an in-phase signal and a quadrature signal in the baseband or low intermediate frequency (IF) band. The system further includes a wideband analog-to-digital converter module that digitizes the in-phase and quadrature signals. The digital in-phase and quadrature signals are provided to a digital frontend module that contains a bank of complex mixers that frequency-shift the number of desired channels to a baseband where the desired channels are individually filtered.

Id., 2:44-55.

364. One embodiment of the '362 Patent's purported invention is shown in FIG. 2, reproduced below:

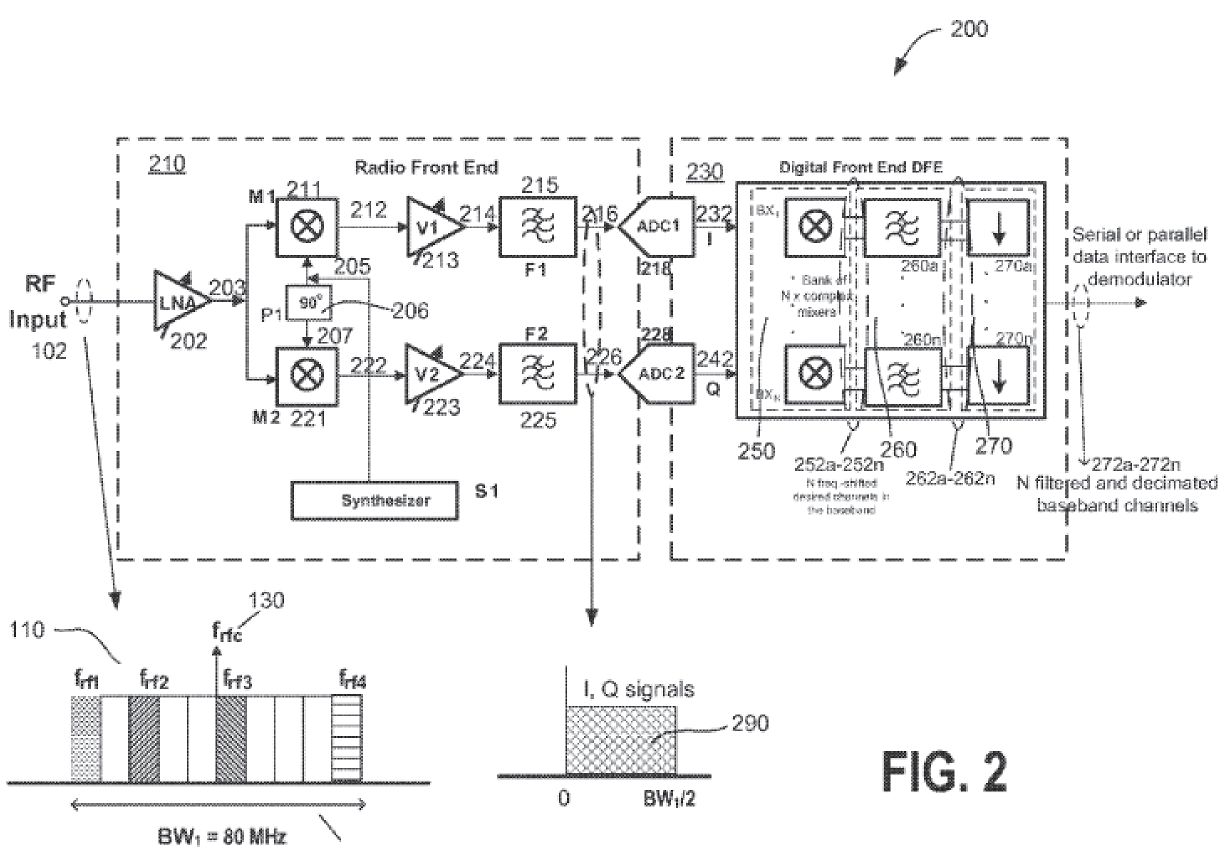


FIG. 2

365. According to the '362 Patent, and as depicted in FIG. 2, "[a]nalog-to-digital converters ADC1 218 and ADC2 228 are high-speed (i.e., high sampling rate) converters to maximize the dynamic range. In an exemplary application, radio front end 210 operates as a

nominal zero-IF down-mixer so that signals 216 and 226 have a nominal bandwidth 290 equal to one half of the RF signal bandwidth BW1 thanks to the complex down-mixer architecture." *Id.*, 5:13-19. According to the '362 Patent, its "approach provides several advantages over conventional tuner architectures. First, it eliminates the need of expensive data conversion, filtering and channel selection on the demodulator side. Second, it removes undesired channels from the signal path at an early stage, thus relieves the large dynamic range requirement in the demodulator." *Id.*, 6:58-64.

c. Prosecution History of the '362 Patent

366. I note that, during prosecution of the application for the '362 Patent, on May 14, 2015, the Examiner issued a non-final rejection of all pending claims (claims 1-20) on the grounds of nonstatutory double patenting over claims 1-27 of U.S. Patent No. 8,526,898 (the "'898 Patent").[17] '362 File History at ENTROPIC_CHARTER_0000639 – 0000643.

367. In response, on May 15, 2015, the Applicant submitted a terminal disclaimer over the '898 Patent. *Id.* at ENTROPIC_CHARTER_0000653 – 0000657.

368. The Examiner issued a Notice of Allowance on August 7, 2015, stating in the Notice that "the prior art made of record teach a wideband receiver system but do not also teach digital circuitry configured to select a plurality of desired television channels from the digitized plurality of frequencies and output said plurality of television channels to a demodulator as a digital datastream." *Id.* at ENTROPIC_CHARTER_0000664 – 0000670.

d. Priority Date / Date of Conception

369. The '362 Patent was filed on February 5, 2015 and is a continuation of U.S. Patent Application No. 13/962,871, filed on August 8, 2013, which, itself, is a continuation of the '898

[17] I note that the '362 Patent is a continuation of the '898 Patent. *See* '362 Patent, Cover (63).

Patent No. 7,522,901 (CHARTER_ENTROPIC00380676 – 00380681) ("Dauphinee") alone or Dauphinee in combination with Favrat.

375. Zhang was filed on September 18, 2002 and was published on March 20, 2003. Favrat ws filed on July 1, 2004 and was published on January 5, 2006. Dauphinee was filed on September 29, 2004 and was published on July 21, 2005.

i. Claim 11 Is Invalid In View Of Zhang

376. In my opinion, as discussed further below, claim 11 is invalid in view of Zhang.

1. [11pre]: "A method comprising:"

377. I understand that this limitation is the preamble of claim 11. I have been asked to treat the preamble as a limitation. As such, in my opinion, Zhang discloses it.

378. For example, Zhang disclosure is directed to "[a] ***method*** and circuitry for implementing digital multi-channel demodulation circuits." Zhang, Abstract. *See also id.*, 1:66-67 ("The present invention provides a method and circuitry for demodulating signals such as downstream signals."), *id.*, 8:53-54 ("[claim] 20. A method for demultiplexing a digital multi-channel RF signal into a plurality of separate content channels").

379. Accordingly, in my opinion, this limitation is disclosed or suggested by Zhang.

2. [11a]: "in a wideband receiver system:"

380. In my opinion, Zhang discloses or suggests this feature.

381. The '362 Patent discloses that its purported invention "relates to wideband receiver systems and methods having a wideband receiver that is capable of receiving multiple radio frequency channels located in a broad radio frequency spectrum." *Id.*, 1:15-18. Further, the patent describes "wideband" tuners as "tuners designed to concurrently receive several TV channels." *Id.*, 1:25-27. The '362 Patent also describes, in its background that a "wide bandwidth of 800 MHz

would require a very expensive digital processing circuitry such as very high-speed analog to digital conversion and high-speed processor in the demodulator." *Id.*, 2:20-23.

382. Similarly, Zhang discloses, for example, "a simplified high-level block diagram of an exemplary multi-channel demodulator 600." Zhang, 6:1-6. The described multi-channel demodulator is depicted below in FIG. 6:

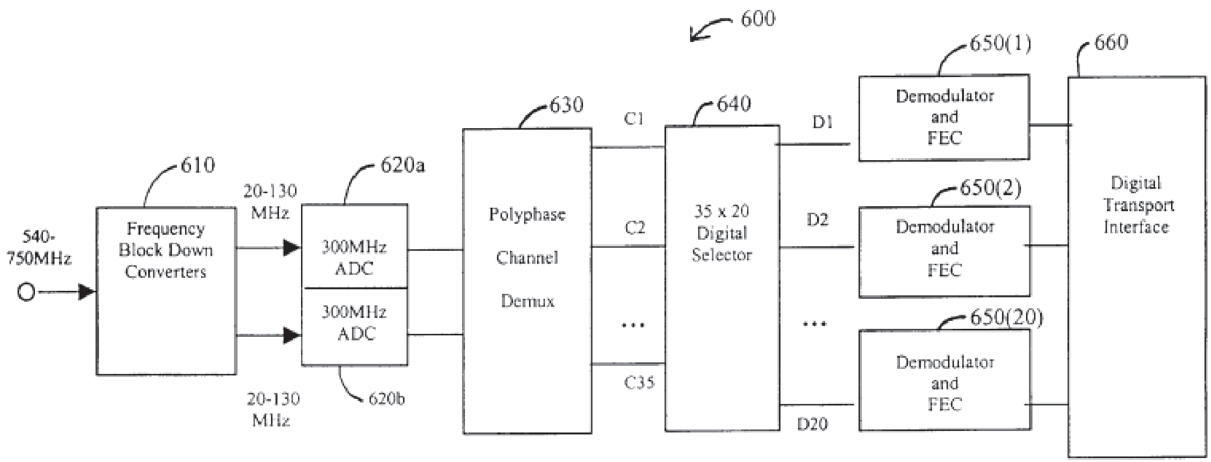


Fig. 6

383. According to Zhang, the received "signal can be sourced by a variety of systems such as satellite systems, terrestrial TV systems, cable systems, etc. In this specific embodiment, the signal is sourced by a cable system. Accordingly, the ***multi-channel analog RF signal is shown to be between 540-750 MHz***," *Id.*, 6:7-11. In my opinion, the multi-channel RF signal of between 540 and 750 MHz disclosed in Zhang is a "wideband" signal in accordance the plain meaning of the term in the context of the '362 Patent.

384. In my view, the disclosed demodulator is, or at least can be implemented in, a wideband receiver. For example, Zhang discloses that "[f]or cable services, a wide-band receiver using the invention can incorporate a DOCSIS return channel." *Id.*, 7:4-6.

385. Accordingly, in my opinion, Zhang discloses or suggests this feature.

3. [11a1]: "downconverting, by a mixer module of said wideband receiver system, a plurality of frequencies that comprises a plurality of desired television channels and a plurality of undesired television channels;"

386. I understand that the parties disagree on the proper construction of the term "downconverting … a plurality of frequencies." CC Order at 48. I understand that the Court has construed this term as having its "Plain meaning." *Id.* at 52. Regardless, under either parties' position, it is my opinion that Zhang in combination with Favrat discloses or suggests this limitation, or at least render it obvious.

387. For example, Zhang discloses that demodulator 200 depicted in FIG. 2 includes "[a] frequency-block down-converter 210 receives one or more multi-channel analog RF signals which can be sourced by a variety of systems such as satellite systems, terrestrial TV systems, cable systems, etc." Zhang, 3:10-14. I have reproduced FIG. 2 of Zhang below:

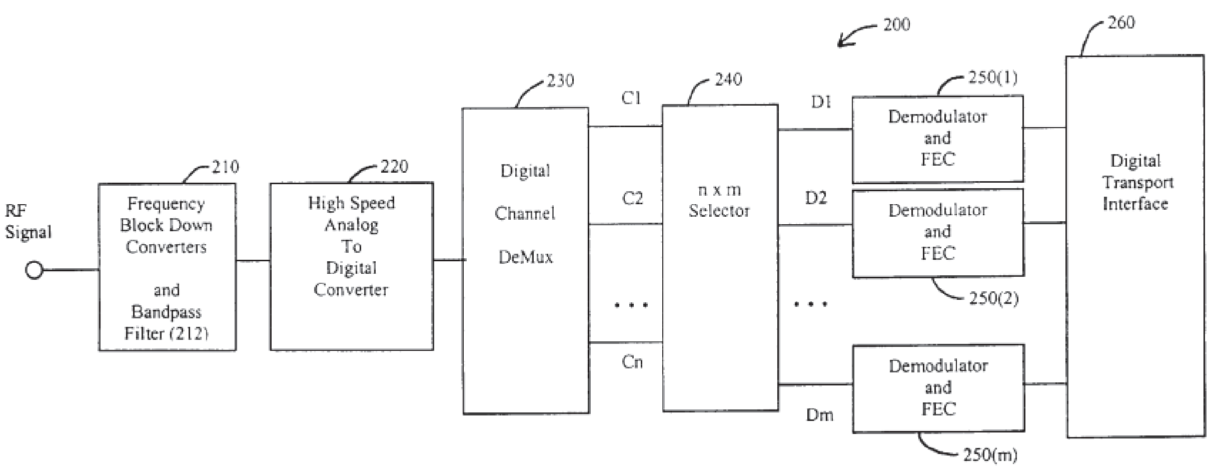


Fig. 2

388. Zhang further discloses that:

> Down converter 210 shifts the multi-channel analog RF signal to a lower frequency band. ***The frequencies are simply downshifted***, i.e., the frequency band of each RF channel and the guard bands remain the same relative to each other, but all are translated down by the same frequency. ***More specifically, the multi-channel analog RF signal is multiplied by a reference signal to a lower frequency band***.

Id., 6:9-17.

389. Zhang discloses that the multi-channel RF signal received by demodulator 200 contains "desired" and "undesired" television channels. For example, Zhang discloses, with respect to selector 240 shown in the figure:

> an n×m digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then ***selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n.*** RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners. ***This is because only the selected channels are later demodulated*** unlike the systems using RF tuners which demodulate all of the RF channels

Id., 3:66-4:9. Based on the foregoing, in my opinion, a POSITA would have understood that the RF signal (here described in the digital domain) is comprised of a plurality of frequencies that contain desired RF channels (i.e., the selected channels D_1 to D_m) and undesired channels (i.e., the remainder of the channels in C_1 to C_n that are not selected into the group D_1 to D_m).

390. A POSITA would have understood that the RF channels are television channels. For example, Zhang discloses that the "frequency-block down-converter 210 receives one or more ***multi-channel analog RF signals which can be sourced by a variety of systems such as satellite systems, terrestrial TV systems, cable systems,*** etc." *Id.*, 3:10-14.

391. I note that the specification of Zhang does not use the term "mixer" in connection with its frequency block down converters, such as frequency block down converter 210 depicted in FIG. 2. In my view, however, a POSITA would have understood that down converter 210, in the architecture taught by Zhang, would be implemented as a mixer, which was a well-known technique for downconverting RF signals at the time of Zhang, and well before the alleged priority date of the '362 Patent.

392. As I discussed earlier, Zhang discloses that down converter 210 downconverts the frequencies of the RF channel in the received RF signal by multiplying the RF signal "to a lower frequency band." *Id.*, 3:35-37. In my opinion, multiplying an RF signal by a reference signal (local oscillator) is known in the art as "mixing." For example, in an analogous reference, U.S. Patent Application Publication No. 2007/0098089 A1 (CHARTER_ENTROPIC00035923 – 35939) ("Li") discloses a receiver (referred to as a receiver portion 10) which is "adapted to receive incoming signals, for example, radio frequency (RF) signals. As one example, incoming signals may be an RF spectrum, for example, of a direct broadcast system (DBS) or DVB satellite service, satellite radio, or another RF system." Li, [¶ 0023]. As shown in FIG. 1 of Li, after amplification by a low noise amplifier, in-phase and quadrature-phase signals are output to channels A and B, respectively. *Id.*

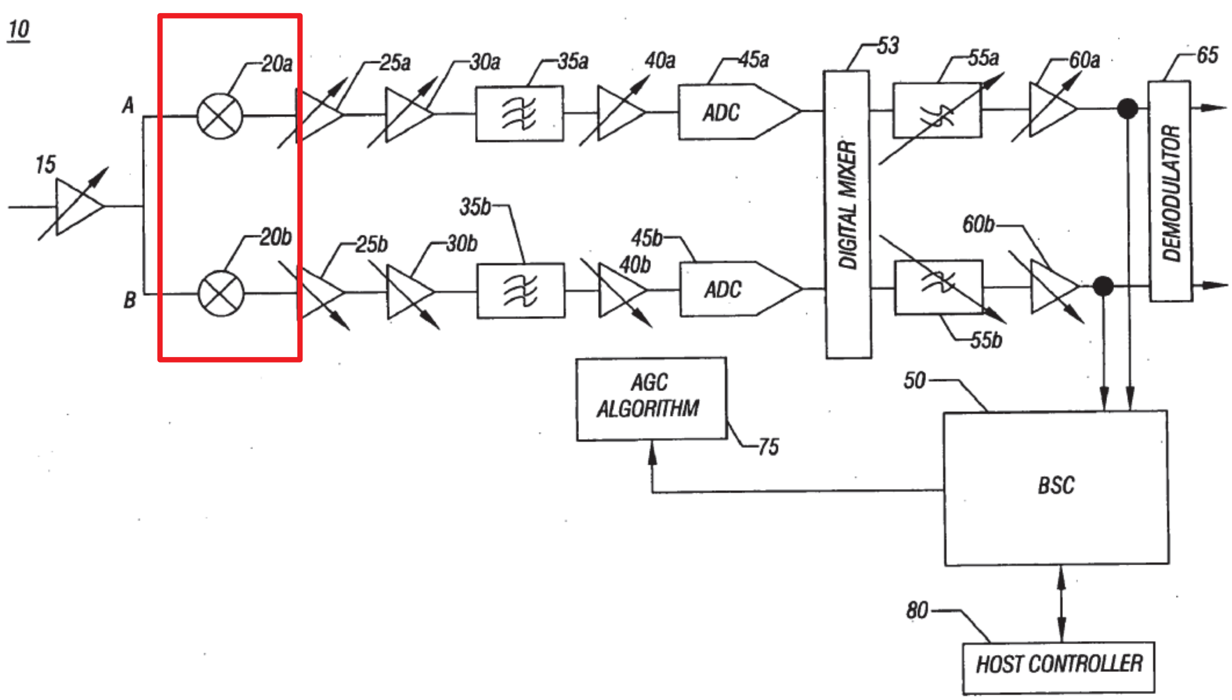


FIG. 1

393. As highlighted in the figure, Li discloses (with respect to in-phase channel A), "the output of LNA 15 is provided to a ***mixer 20 a, which downconverts the incoming RF signals to an intermediate frequency (IF)***." *Id.*, [¶ 0024]. Li goes on to disclose that "it is to be understood that ***mixer 20 a may mix the incoming signals with a received local oscillator (LO) frequency***." *Id.* Li, therefore, confirms my understanding that Zhang's frequency block downconverters are mixers (or mixer modules) within the meaning of the '362 Patent.

394. Accordingly, in my opinion, Zhang discloses or suggests this limitation.

4. [11a2]: "digitizing, by a wideband analog-to-digital converter (ADC) module of said wideband receiver system, said plurality of frequencies comprising said plurality of desired television channels and said plurality of undesired television channels;"

395. In my opinion, Zhang discloses or suggests this limitation.

396. Referring back to FIG. 2 of Zhang, reproduced and annotated below, Zhang discloses an ADC (analog-to-digital converter) 220.

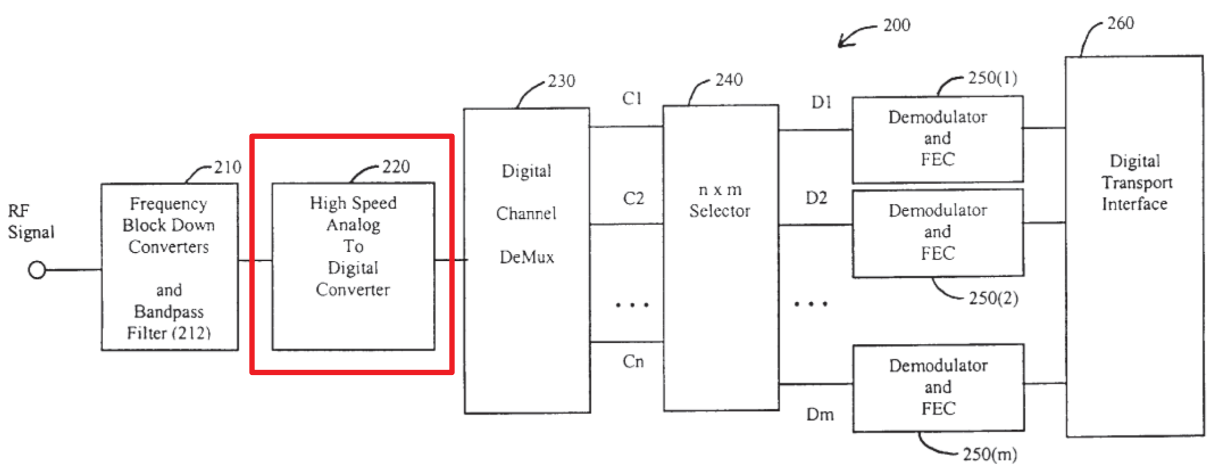


Fig. 2

397. According to Zhang, "ADC 220 then converts the down-converted multi-channel analog RF signal to a multi-channel ***digital*** RF signal. In this specific embodiment, ***ADC 220 is a high-speed ADC so that an entire signal band with n channels can be converted***." Zhang, 3:55-

59. I note that the '362 Patent does not define what a wideband analog-to-digital converter (ADC) module is. However, in my opinion, Zhang's ADC 220, by virtue of it being a "high-speed ADC" having the ability to convert the entire signal band with all n channels, ADC 220 meets the requirement of a "wideband" ADC module.

398. As I discussed in Section XII.g.i.3, the RF signal received by Zhang's demodulator contains both "desired" and "undesired" television channels. As a result, ADC 220 digitizes both the desired and undesired television channels present in the received RF signal.

399. Therefore, in my opinion, Zhang discloses or suggests this limitation.

5. [11a3]: "selecting, by digital circuitry of said wideband receiver system, said plurality of desired television channels from said digitized plurality of frequencies; and"

400. In my opinion, Zhang discloses or suggests this limitation.

401. For example, as highlighted below in annotated FIG. 2, Zhang discloses both a digital channel demultiplexer and what Zhang refers to as an nxm digital selector.

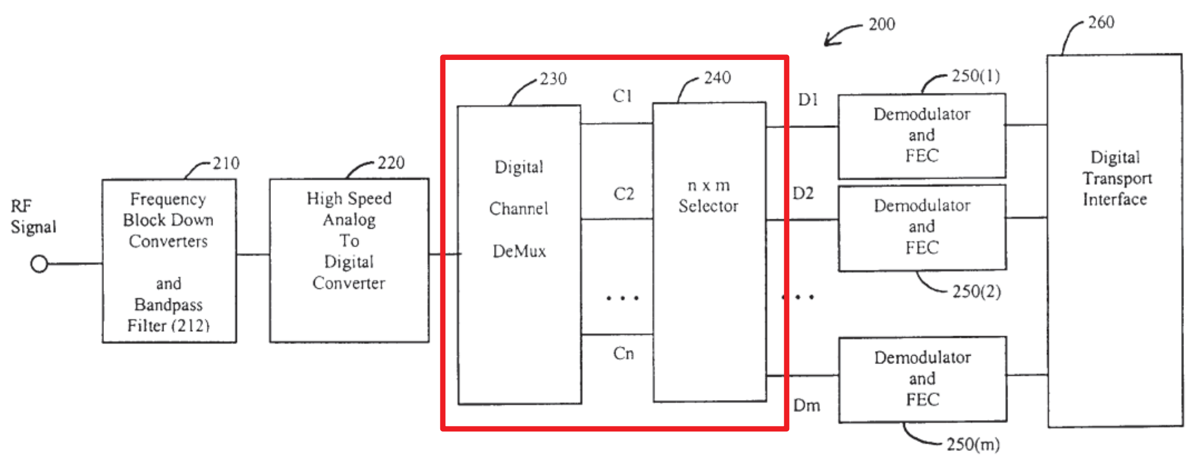


Fig. 2

402. According to Zhang:

> A ***digital channel demultiplexer 230*** then ***demultiplexes the multi-channel digital RF signal into separate digital RF channels*** C_1 to C_n. The specific implementation of channel demultiplexer 230 will depend on the specific application and

> requirements. Alternative channel demultiplexer embodiments are described in more detail below (FIGS. 2 and 3). Still referring to FIG. 2, ***an n×m digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n***. RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners. This is because o***nly the selected channels are later demodulated unlike the systems using RF tuners which demodulate all of the RF channels***.

Id., 3:60-4:9. The '362 Patent does not define the term "digital circuitry." In my opinion, however, Zhang's digital channel demultiplexer 230 and digital selector 240 are each "digital circuitry."

403. Zhang, for example, discloses a "digital tuner 300," which can be used to implement digital channel demultiplexer 230. *Id.*, 4:33-36. Zhang goes on to refer to digital tuner 300 as "[d]igital tuner ***circuit*** 300," which "outputs the separated RF channels C_1 to Cn, each RF channel being centered at baseband." *Id.*, 4:65-67.

404. Zhang discloses another embodiment of digital channel demultiplexer 230, which, in this case, is a "polyphase channel demultiplexer 400." *Id.*, 5:1-2. Zhang goes on to discloses that "[p]olyphase channel demultiplexer 400 includes a bank of low-pass filters (LPFs) 410(1 . . . n) and a ***discrete Fourier transform circuit*** (DFT) 420." *Id.*, 5:5-7.

405. With respect to digital selector 240, in my opinion, Zhang confirms (aside from its name) that it is implemented using digital circuitry. Indeed, Zhang contrasts digital selector 240 with "traditional" analog circuitry. *See, e.g., id.*, 4:4-6 ("Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners.").

406. As demonstrated by the above quoted passage, Zhang discloses that digital channel demultiplexer 230 and digital selector 240 select desired television channels from a multi-channel digital RF signal. Zhang discloses:

> Still referring to FIG. 2, an n×m digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then ***selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n***. RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners. ***This is because only the selected channels are later demodulated unlike the systems using RF tuners which demodulate all of the RF channels***.

Id., 3:66-4:9.

407. Therefore, in my opinion, Zhang discloses or suggests this limitation.

6. [11a4]: "outputting, by said digital circuitry of said wideband receiver system, said selected plurality of television channels to a demodulator as a digital datastream."

408. In my opinion, Zhang discloses or suggests this feature.

409. For example, still referring to FIG. 2, Zhang discloses:

> ***The m selected RF channels are then fed into respective demodulators 250(1), 250(2), . . . 250(m)***. The architecture of demodulator 200 enables it to handle multi-channel satellite, terrestrial TV (NTSC, ATSC, DVB-T, etc), and cable downstream signals. In some embodiments ***demodulators 250(1 . . . m) are shared demodulators because they share resources. Many functional blocks can be shared between different demodulators***. Such functional blocks, for example, can include numeric controlled oscillators (NCOs), timing error detection circuitry, carrier recover circuitry, etc. Because of the resource sharing between such demodulators, significant power saving is achieved. Hence, with such embodiments of the present invention, more RF channels can be demodulated in a single chip.

Id., 4:13-26.

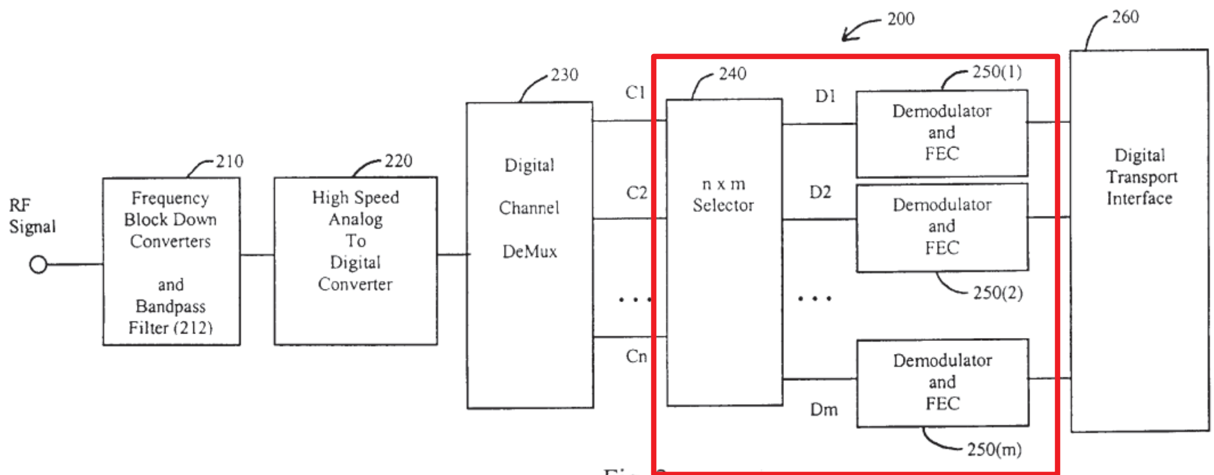


Fig. 2

410. Thus, as disclosed, the selected channels are output from digital selector 240 to a corresponding demodulator 250. Each of the selected RF channels D_1 to D_m is a digital datastream. For example, with respect to the RF channels received by Zhang's demodulators are "data streams":

> A given RF channel carries one or more "content" channels, which are ***data streams*** that are superimposed on that channel's carrier frequency and intended to be accessed or used by subscribers. As used here, one RF channel can carry one or more content channels. Accordingly, ***one RF channel can provide a variety of data streams***, some of which are selected by a subscriber, e.g., audio, video, etc. Other data streams might be pre-programmed or selected by a program provider, e.g., conditional access data, etc.

Id., 3:20-30. In addition, Zhang discloses that the RF channels selected by digital selector 240 are ***digital***. See *id.*, ("digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then ***selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n***."). It is also my opinion that, not only are the individual selected digital RF channels, themselves, digital datastreams, but also that a POSITA would have understood that the collection of all m selected RF channels (i.e., the collection of channels D_1 to D_m) comprise a digital datastream within the meaning of the '362 Patent.

411. To the extent that the claim is found to require a single demodulator,[18] rather than "respective demodulators 250(1), 250(2), . . . 250(m)" (*id.*, 4:13-14) that are disclosed in the embodiment of FIG. 2, Zhang nonetheless discloses or suggests this. For example, with respect to the demodulators 250, Zhang discloses:

> In some embodiments ***demodulators 250(1 . . . m) are shared demodulators because they share resources. Many functional blocks can be shared between different demodulators***. Such functional blocks, for example, can include numeric controlled oscillators (NCOs), timing error detection circuitry, carrier recover circuitry, etc. Because of the resource sharing between such demodulators, significant power saving is achieved. Hence, with such embodiments of the present invention, more RF channels can be demodulated in a single chip.

Id., 4:17-25. Therefore, in my view, a POSITA would have recognized that demodulators 250(1 … m) could be implemented as either separate demodulators on different chips, or as an integrated, single-chip demodulator.

Therefore, it is my opinion that Zhang discloses or suggests this limitation.

ii. Claim 12 Is Invalid In View Of Zhang In Combination with Favrat

1. [12]: "The method of claim 11, comprising outputting, by said digital circuitry of said wideband receiver system, said digital datastream via a serial interface."

412. In my opinion, Zhang in combination with Favrat would have rendered this claim obvious.

413. As I discussed in Section XII.g.i.6, Zhang discloses that the digital RF channels selected by digital selector 240 are fed into respective demodulators 250(1), 250(2), …, 250(m), which, according to Zhang, can be a single, shared demodulator. Zhang, however, does not

[18] I have been informed that the recitation of an indefinite article, such as "a" or "an," in a patent claim carries the meaning of "one or more."

expressly disclose that the selected RF channels are provided to the demodulators via a serial interface are converted to a digital data stream to be sent to a demodulator.

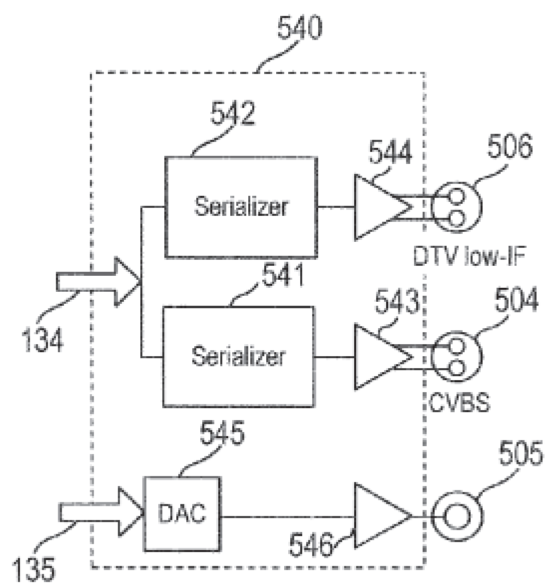
414. It is important to note that the ’362 Patent acknowledges that outputting selected (or “desired”) channels using a serial data interface was already known in the art. *See, e.g.*, ’362 Patent, 6:55-58 (“The reduced sampling rate of the N desired baseband channels will be sent as a serial or parallel digital data stream to a demodulator ***using a serial or parallel data interface according to commonly known methods***”). I agree with the ’362 Patent’s admission. I point to Favrat, as an exemplary reference that expressly discloses the commonly known features recited in claim 12.

415. Favrat, in field similar to Zhang, is directed to “a dual-format television (TV) receiver for receiving analog and digital TV signals uses a single signal processing circuit for processing the received input RF television signal.” Favrat, 3:9-12. Favrat’s receiver includes “a frequency conversion circuit (a tuner), a digitizing IF circuit, a digital signal processor (DSP) circuit and a signal output circuit.” *Id.*, 3-20-22. According to Favrat, “the signal output circuit receives the digital output signals from the signal processor and provides one or more output signals corresponding to the digital output signals.” *Id.*, 2:42-45.

416. FIG. 1, reproduced below, depicts Favrat’s receiver, which includes a frequency conversion circuit 110, a digitizing IF circuit 120, a digital signal processor (DSP) circuit 130, and a signal output circuit 140:

419. Next, "[t]he processed IF signals on terminals 134 and 135 are coupled to signal output circuit 140 to be converted into the desired output signals." *Id.*, 6:49-51. Although the signal output circuit in FIG. 1 converts the digital IF signals to analog (via DACs 141 and 145), Favrat depicts other embodiments of its signal output circuit, which I discuss below.

420. For example, in an alternative embodiment to the signal output circuit 140 depicted in FIG. 1, Favrat discloses a signal output circuit 540, which I have excerpted from FIG. 2 and reproduced below:



Id., FIG. 2 (excerpt).

421. As shown, "a signal output circuit 540 includes a ***first serializer 541*** and a ***second serializer 542*** so that the video signals from the signal output circuit are provided as ***serial digital interfaces***." *Id.*, 8:3-6. Further, as shown in the figure, serializer 541 and serializer 542 both receive processed digital IF video signal 134. According to Favrat, "[s]erializer 542 and driver 544 form a parallel data path providing a serial digital data stream on an output terminal 506." *Id.*, 8:10-12. As Favrat discloses, "[t]he ***serial digital data on output terminal 506 can be coupled to***

a digital demodulator and a decoder ***for demodulating*** and decoding the ***digital television signals***." *Id.*, 8:17-19. In my opinion, a POSITA would have understood that Favrat's coupling of serializer 542 to a digital demodulator via output terminal 506 is a "serial interface."

422. In my opinion, a POSITA would have been motivated to implement Favrat's serial interface in Zhang's digital multi-channel demodulator with a reasonable expectation of success. For example, Zhang notes that undue power consumption is a concern with traditional prior art multi-channel cable and satellite demodulators. *See* Zhang, 1:60-63. One source of this power consumption is Zhang's demodulator, which Zhang addresses by implementing its demodulators so that they share resources. *See id.*, 4:13-19. In my opinion, implementing Favrat's technique of serializing selected RF channels and outputting those selected RF channels to a digital demodulator would further Zhang's interest in reducing power consumption as doing so would reduce the number of buses needed between selector 240 and demodulators 250 shown in FIG. 2. Indeed, this reduction in the number of buses between the selector and a demodulator bank is suggested in the embodiment shown in FIG. 7 of Zhang, which I have reproduced below:

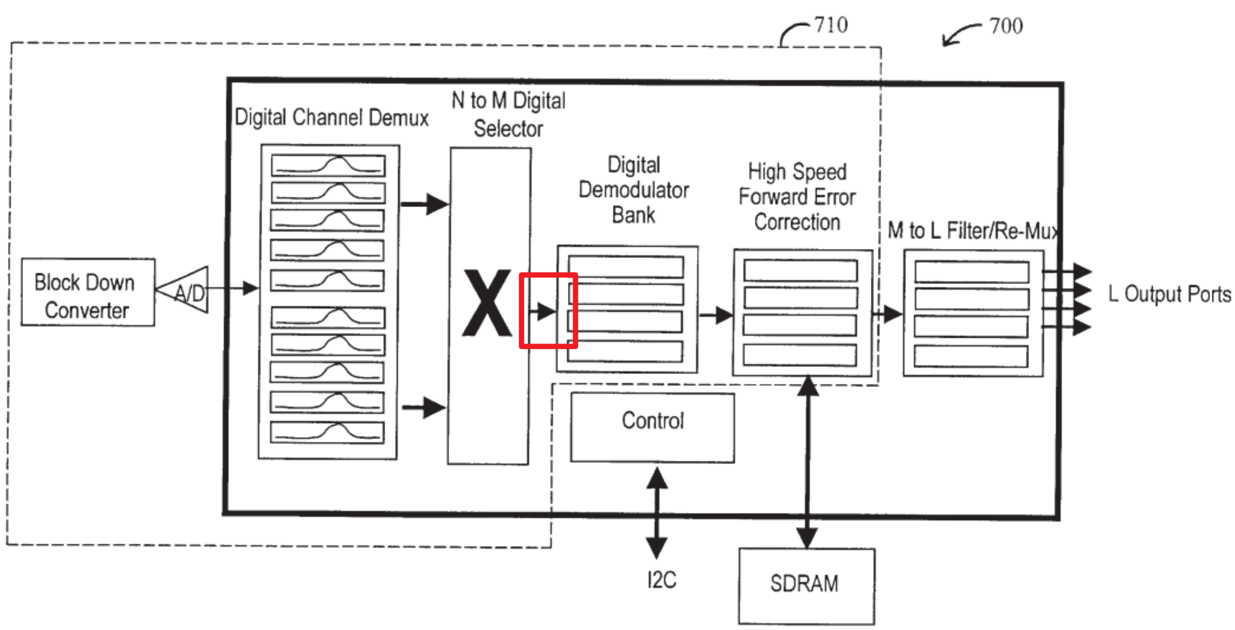


Fig. 7

423. As shown, in my view, it would have been obvious to implement the highlighted connection between the N to M Digital Selector and the Digital Demodulator Bank using the well-known serialization techniques disclosed in Favrat. Doing so, in my opinion, would have involved nothing more than applying Favrat's known serialization technique to a Zhang's known multi-channel demodulator to yield predictable results, namely, an improved multi-channel demodulator that achieves an additional reduction in power consumption.

424. Therefore, Zhang in combination with Favrat would have rendered this claim obvious.

iii. Claim 11 Is Invalid In View Of Dauphinee

425. In my opinion, as discussed further below, claim 11 is invalid in view of Dauphinee.

1. [11pre]: "A method comprising:"

426. As I discussed above, I understand that this limitation is the preamble of claim 11. I have been asked to treat the preamble as a limitation. As such, in my opinion, Dauphinee discloses it.

427. For example, Dauphinee discloses "improved methods and systems for tuning." Dauphinee, 1:26-27. *See also id.*, 7:5-6 ("[Claim] 15. A method for tuning an RF signal having multiple channels using a direct sampling tuner, comprising …").

428. Accordingly, in my opinion, Dauphinee discloses this limitation.

2. [11a]: "in a wideband receiver system:"

429. In my opinion, Dauphinee discloses or suggests this feature.

430. For example, Dauphinee discloses "a tuner 100, according to one embodiment of the present invention. Tuner 100 includes a direct sampling analog-to-digital converter ("ADC") 106. The ADC 106 samples a signal 116 at a Nyquist frequency (i.e., greater than twice the frequency of the signal 116). As a result, image problems associated with conventional tuners are

processing circuitry such as very high-speed analog to digital conversion and high-speed processor in the demodulator." '362 Patent, 2:20-23.

473. FIG. 2 of the patent depicts an exemplary receiver system in accordance with the claimed invention. All of the disclosed embodiments contain these basic components:

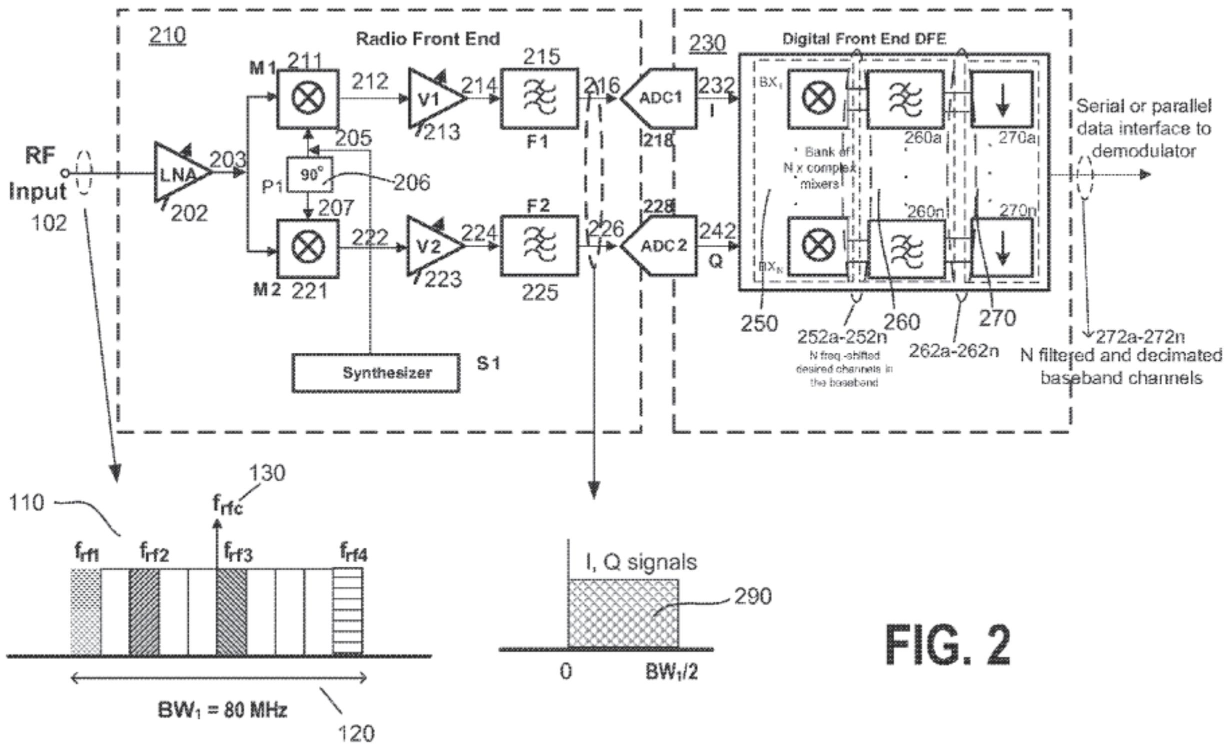


FIG. 2

474. The incoming signal is received into the "radio front end" on the left, and is described as the "RF Input" or "RF signal." '362 Patent, 1:48-50; 4:27-28. "RF" means it is an analog signal.

475. The radio front end is said to, in some way, capture a "swath" of channels from the RF signal that includes the "desired" channels (channels the customer is interested in) and undesired channels (1:27-31). That swath has a bandwidth designated BW_1. *Id.* 1:67-2:2, 4:19-22, Fig. 2. BW_1 can be as wide as "800 MHz or higher," which would require the expensive analog to digital converters. *Id.* 2:20-23. That is the bandwidth that must be reduced.

476. The analog swath having bandwidth BW_1 is provided as input to mixers 211 and 221. (*Id.* 4:37-39.) Together, these mixers constitute a "complex mixer module for down-shifting the multiple RF channels and transforming them to an in-phase signal and a quadrature signal in the baseband or low intermediate frequency (IF) band." (*Id.* 2:45-49, 4:40-53.) "The system further includes a wideband analog-to-digital converter module that digitizes the in-phase and quadrature signals." (*Id.* 2:49-51.) These are the ADCs 218 and 228 in Fig. 2. The signal supplied to the ADCs is "one half of the RF signal bandwidth BW1 thanks to the complex down-mixer architecture" 211/221 (*Id.* 5:15-19, Fig. 2.) That is the reduction in bandwidth – achieved by mixers 211/221 – that allows the less expensive analog to digital converters to be used.

477. The output from the ADCs are "digital signals." (*Id.* 5:28-31.) These digital signals are supplied to a different "bank of N complex mixers 250," each of which "receives the digital signals… from ADCs 218 and 228 to extract a different one of the desired channels and frequency-shifts the extracted signals to the baseband frequency." (*Id.* 5:49-52.) Thus, the mixers 250 operate only on digital signals, and frequency shift *only the desired channels*. This digital downconversion is always disclosed as being done after the downconversion of the analog signal containing both the desired and undesired channels - it never replaces the analog downconversion.

478. All disclosed embodiments are similar in these regards. (See, e.g., Figs 2, 4 and 6).

479. As such, the specification does not describe or enable -- and in fact teaches away from -- a system which (i) does not downcovert the incoming analog signal before analog to digital (A-D) conversion; (ii) does not transform the analog signal into in-phase and quadrature components before A-D conversion; (iii) does not include a Radio Front End; (iv) digitizes the entire incoming RF signal as-is; (v) digitally downconverts both desired and undesired channels; or (vi) does not perform all of the claim steps in the order recited in the claim. Because, as

written description of the '682 Patent and fails to enable a POSITA to practice the full scope of the claim.

j. Objective Indicia of Non-Obviousness Regarding the '682 Patent

578. I am unaware of any objective indicia that would counter the obviousness analysis with respect to the '682 Patent that I provided above. I understand that Charter has requested Entropic's positions regarding secondary considerations and objective indicia, to which Entropic did not provide a substantive, non-conclusory response. To the extent Entropic provides additional information regarding the claims of the '682 Patent, I reserve the right to amend my opinions in response.

XIV. CONCLUSION

579. For the reasons stated herein, it is my opinion that each and every patent asserted against Charter in this litigation is invalid. I reserve the right to respond to any evidence (including expert opinions) that Entropic may offer in response to my opinions.

Steven H. Goldberg, Ph.D. (E.E.)